

FIG. 1

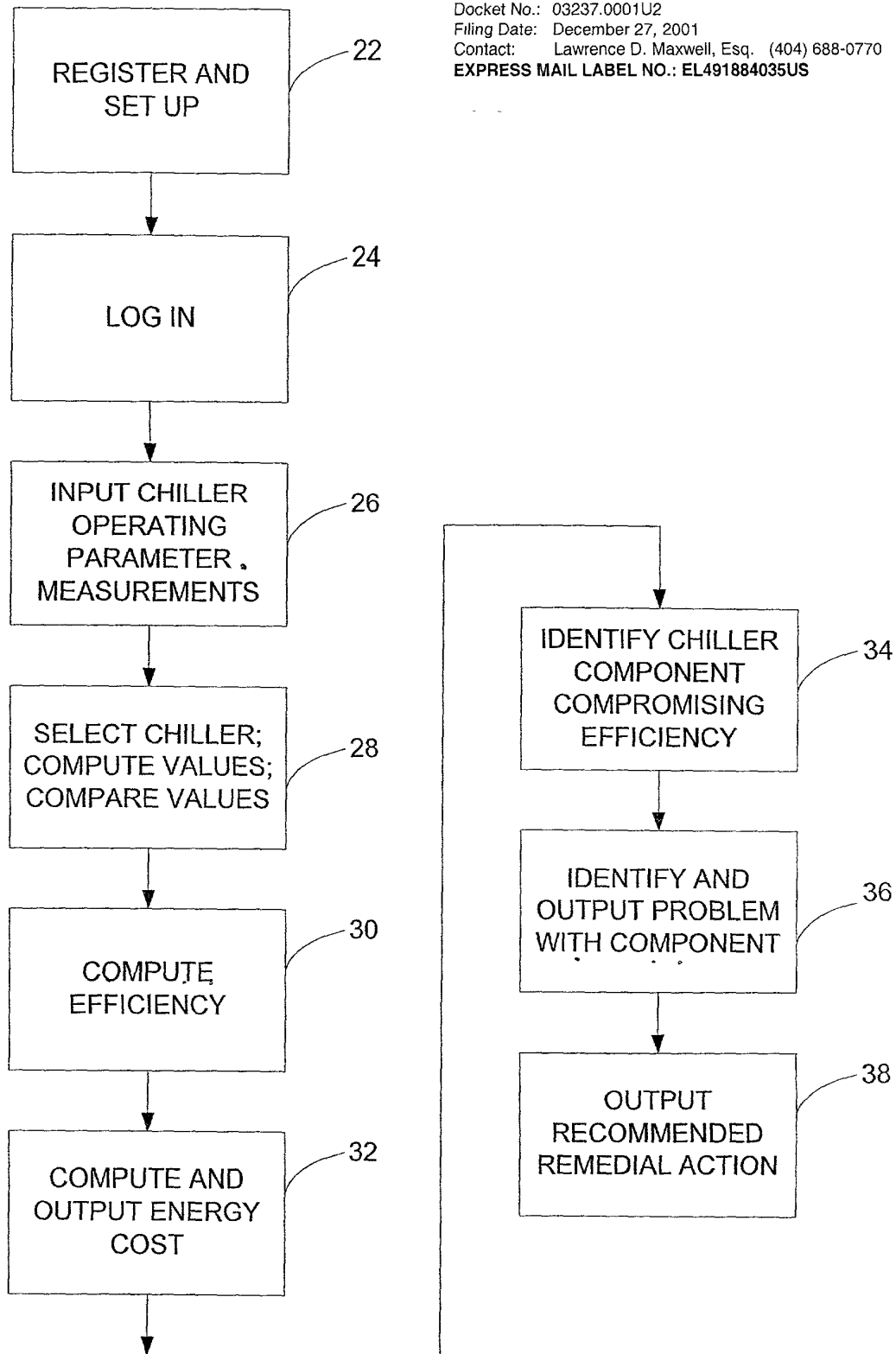


FIG. 2

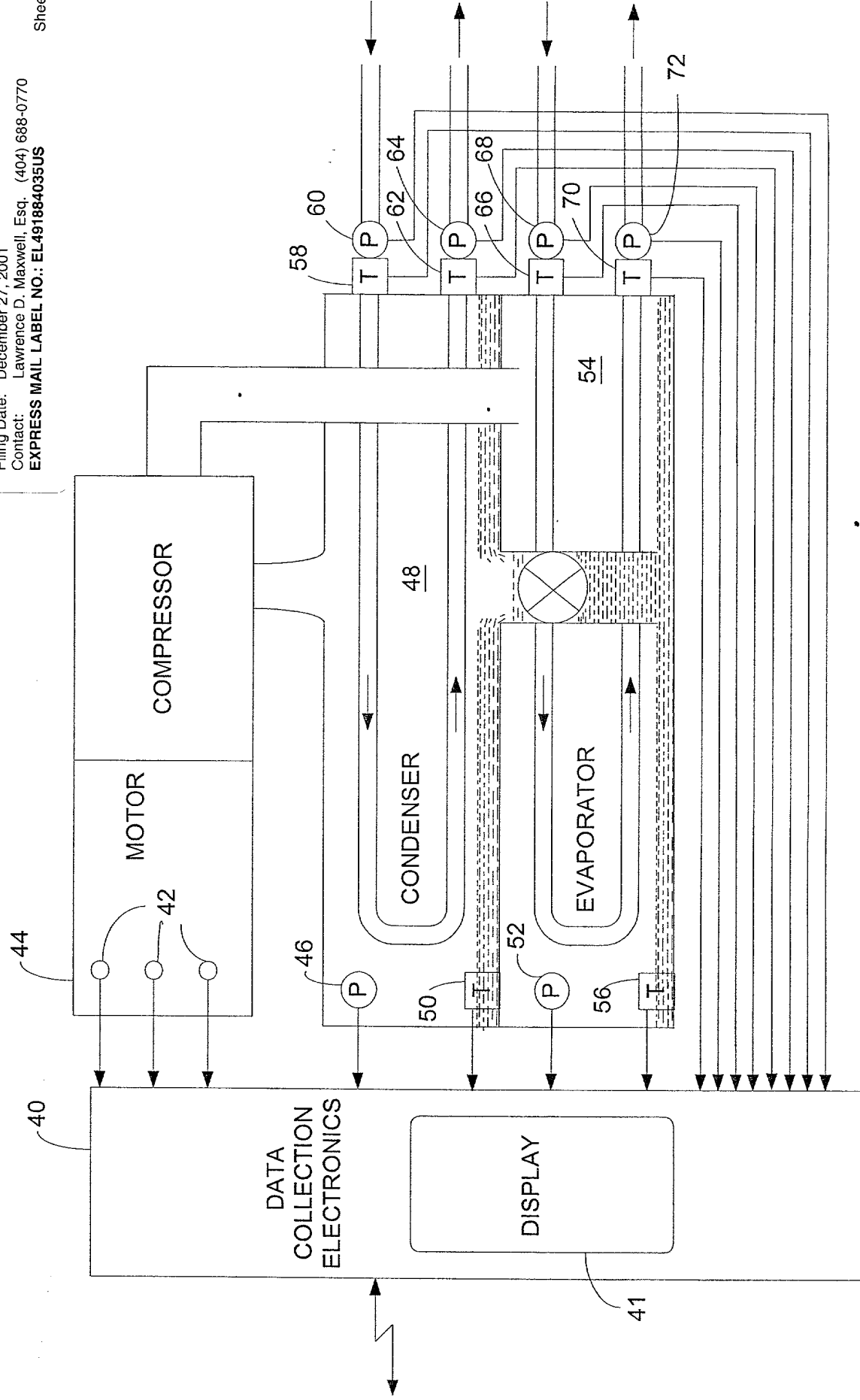


FIG. 3

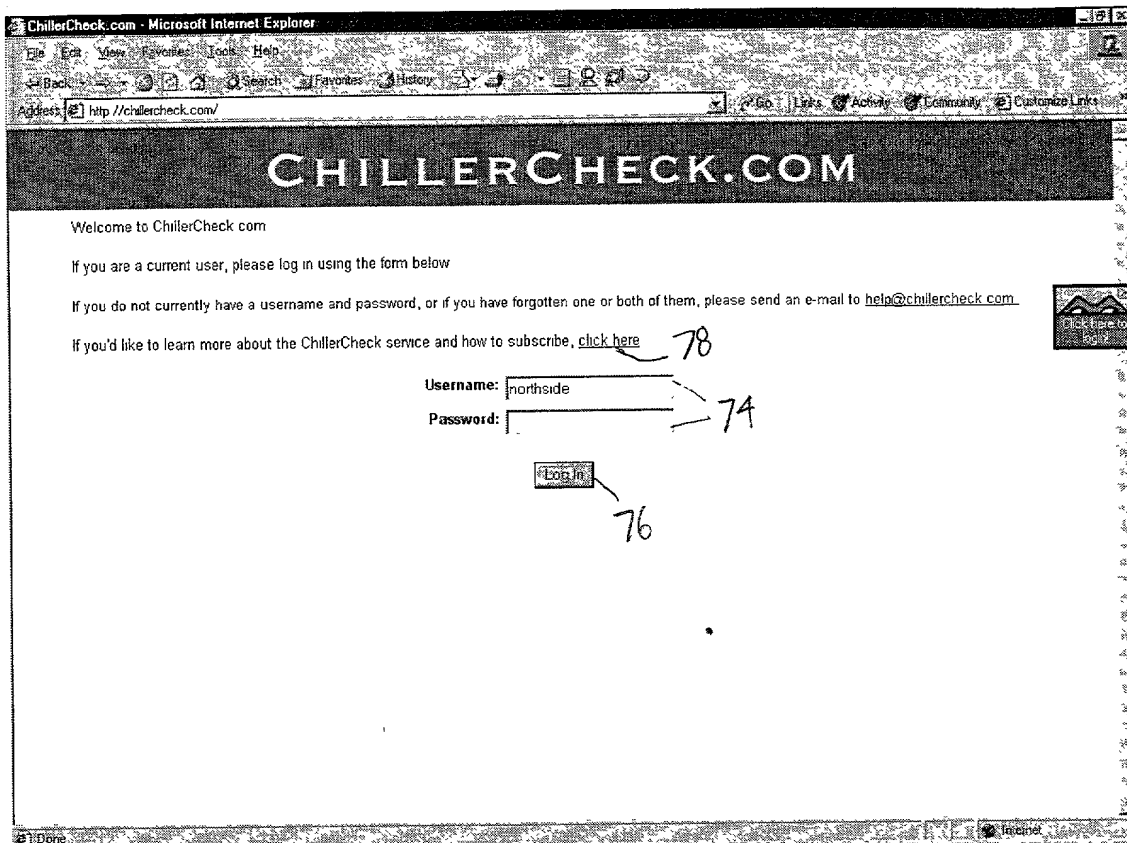


FIG. 4

Inventor: Lawrence J. Seigel
 Title: "METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY
 OF AN AIR CONDITIONING APPARATUS"
 Serial No.: Unassigned
 Docket No.: 03237.0001U2
 Filing Date: December 27, 2001
 Contact: Lawrence D. Maxwell, Esq. (404) 688-0770
 EXPRESS MAIL LABEL NO.: EL491884035US

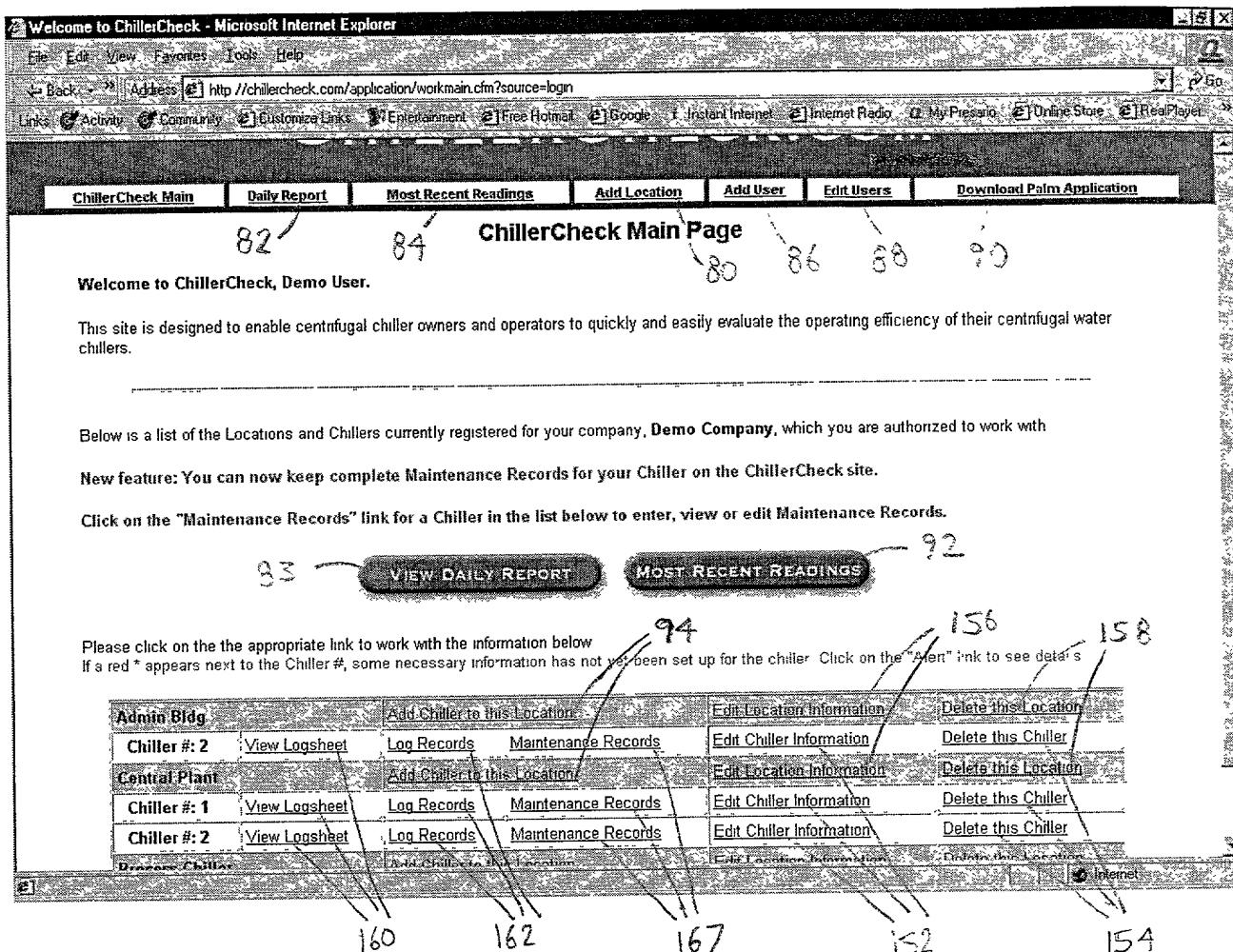


FIG. 5

CHILLERCHECK.COM

ChillerCheck Main	Daily Report	Most Recent Readings	Add Location	Add User	Edit Users	Download Palm Application
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82 84 Add a Chiller at Atlanta Office Bldg. 86 88 90

Please fill in all information in the form below, then click the "Add Chiller" button.

You will then be taken back to the ChillerCheck Main page, where you can work with any of your Location, Chiller or Chiller Log records.

Note: If you do not have all the information below available at this time, you can still add the Chiller by filling out only the required information (marked with a * below) now. You can come back later and add the rest of the information. However, you will not be able to make efficiency calculations or graph trends until all Chiller information has been recorded.

Chiller Information








 * Chiller #:	<input type="text" value="96"/>
* Make:	<input type="text" value="Choose a Make"/> 98
 * Model:	<input type="text" value="100"/>
 Serial #:	<input type="text" value="102"/>
 * Refrigerant Type:	<input type="text" value="Choose a refrigerant"/> 104
 Year Chiller Was Manufactured:	<input type="text" value="Choose a year of manufacture"/> 106
 * Efficiency Rating (kw/ton):	<input type="text" value="108"/>
 * Energy Cost (\$/kw hour):	<input type="text" value="110"/>

FIG. 6A

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* Weekly Hrs. of Operation:	<input type="text" value="112"/>
* Weeks Per Year of Operation:	<input type="text" value="114"/>
* Average Load Profile:	<input type="text" value="116"/> %
* Tons:	<input type="text" value="118"/>
* Design Voltage:	<input type="text" value="120"/>
* Full-Load Amperage:	<input type="text" value="122"/>
Now we need some information about the Condenser.	
Design Condenser Water Pressure Drop: <small>(This value may be omitted if necessary, but your calculations will be more accurate if you have it. If you enter a value, you must choose a unit of measure.)</small>	<input type="text" value="124"/> <input type="text" value="126"/> Choose a pressure unit <input type="text"/>
Please choose a unit of measurement for the Actual Condenser Water Pressure Drop:	<input type="text" value="128"/> Choose a pressure unit <input type="text"/>
Please choose a unit of measurement for Condenser Pressure:	<input type="text" value="130"/> Choose a pressure unit <input type="text"/>
Design Condenser Approach Temp: <small>(This value may be omitted if you do not have it.)</small>	<input type="text" value="132"/>

FIG. 6B

FIG. 6B

10034755 4004501

Now we need some information about the Evaporator.

<p>Design</p> <p>Chill Water Pressure Drop: (This value may be omitted if necessary, but your calculations will be more accurate if you have it. If you enter a value, you must choose a unit of measure.)</p>	<p>Choose a pressure unit ▼</p> <p>134 136</p>
<p>Please</p> <p>choose a unit of measurement for the Actual Chill Water Pressure Drop:</p>	<p>Choose a pressure unit ▼</p> <p>138</p>
<p>Please</p> <p>choose a unit of measurement for Evaporator Pressure:</p>	<p>Choose a pressure unit ▼</p> <p>140</p>
<p>Design</p> <p>Evaporator Approach Temp: (This value may be omitted if you do not have it.)</p>	<p>142</p>
<p>Evaporator</p> <p>Design Outlet Water Temp:</p>	<p>144</p>
<p>Please choose a method of calculating Oil Pressure Differential for the Compressor.</p>	
<p>Calculate</p> <p>Differential by:</p>	<p>Choose a method ▼</p> <p>146</p>

FIG. 6D

There are just a few more things we need to know about this chiller.	
Does the chiller have a readout for Purge Run Time?	<input checked="" type="radio"/> Yes <input checked="" type="radio"/> No 143
If so, is the Purge Run Time measured only in minutes, or in both hours and minutes?	<input checked="" type="radio"/> Minutes Only <input checked="" type="radio"/> Hours and Minutes 145
Please set a maximum amount of Purge Run Time per day you wish to allow before you are sent an alert.	Minutes 147
Does this chiller have a readout for Bearing Temperature?	<input checked="" type="radio"/> Yes <input checked="" type="radio"/> No 149
Operator Notes: (Enter any notes you might want to record about this chiller.)	150
Add Chiller Info	

148

FIG. 6D

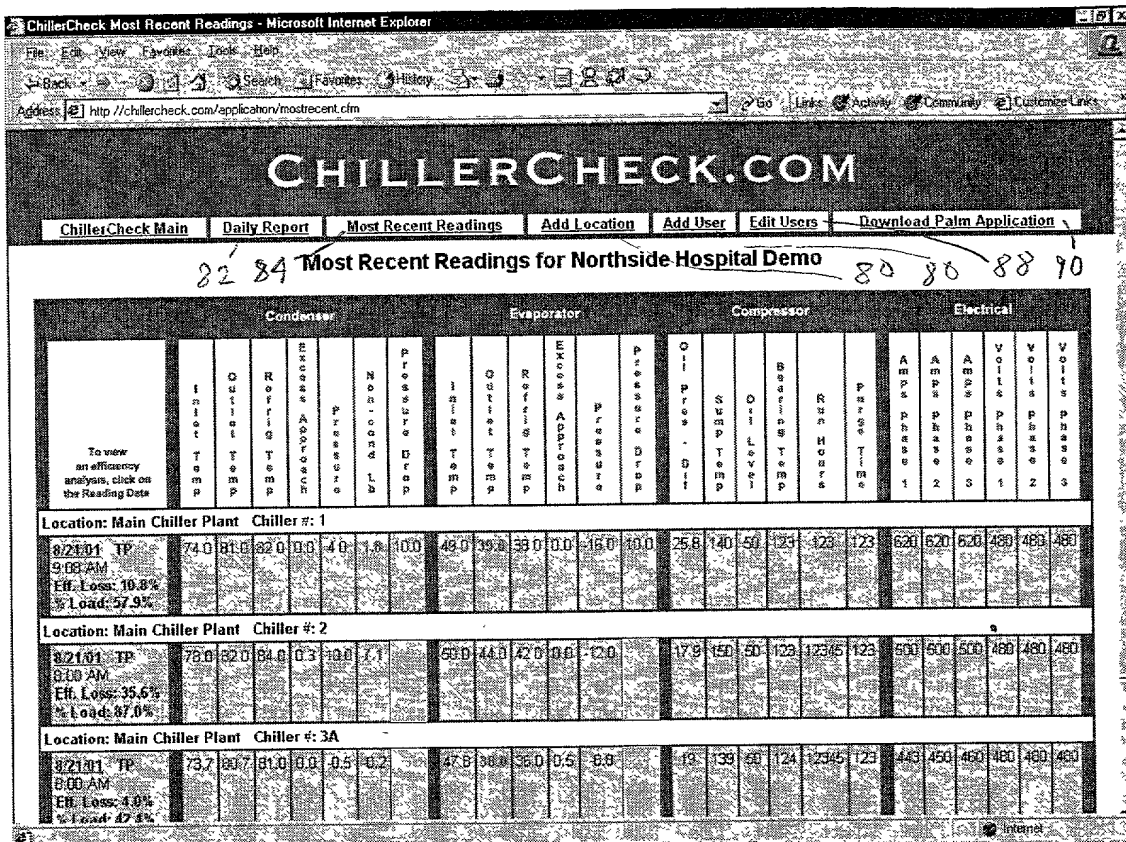


FIG. 7

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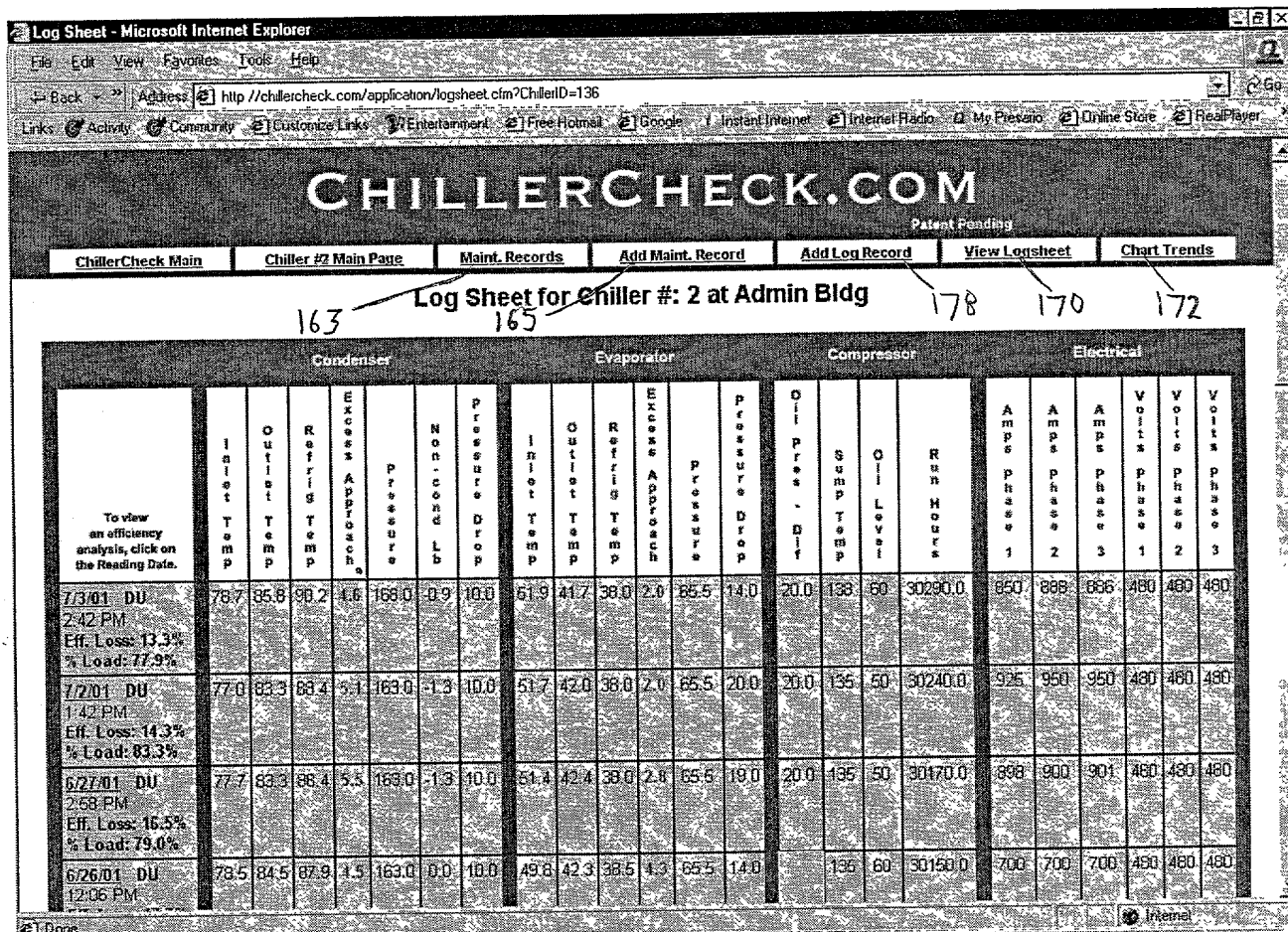


FIG. 8

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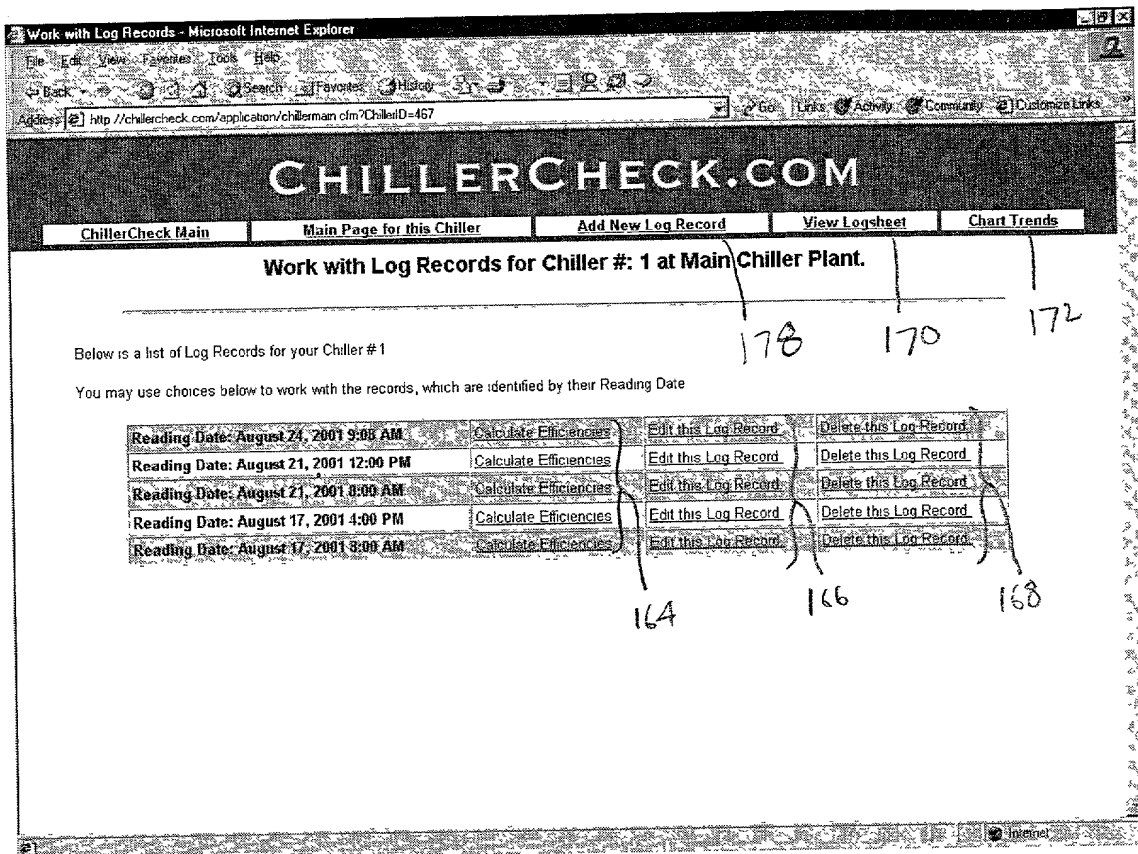


FIG. 9

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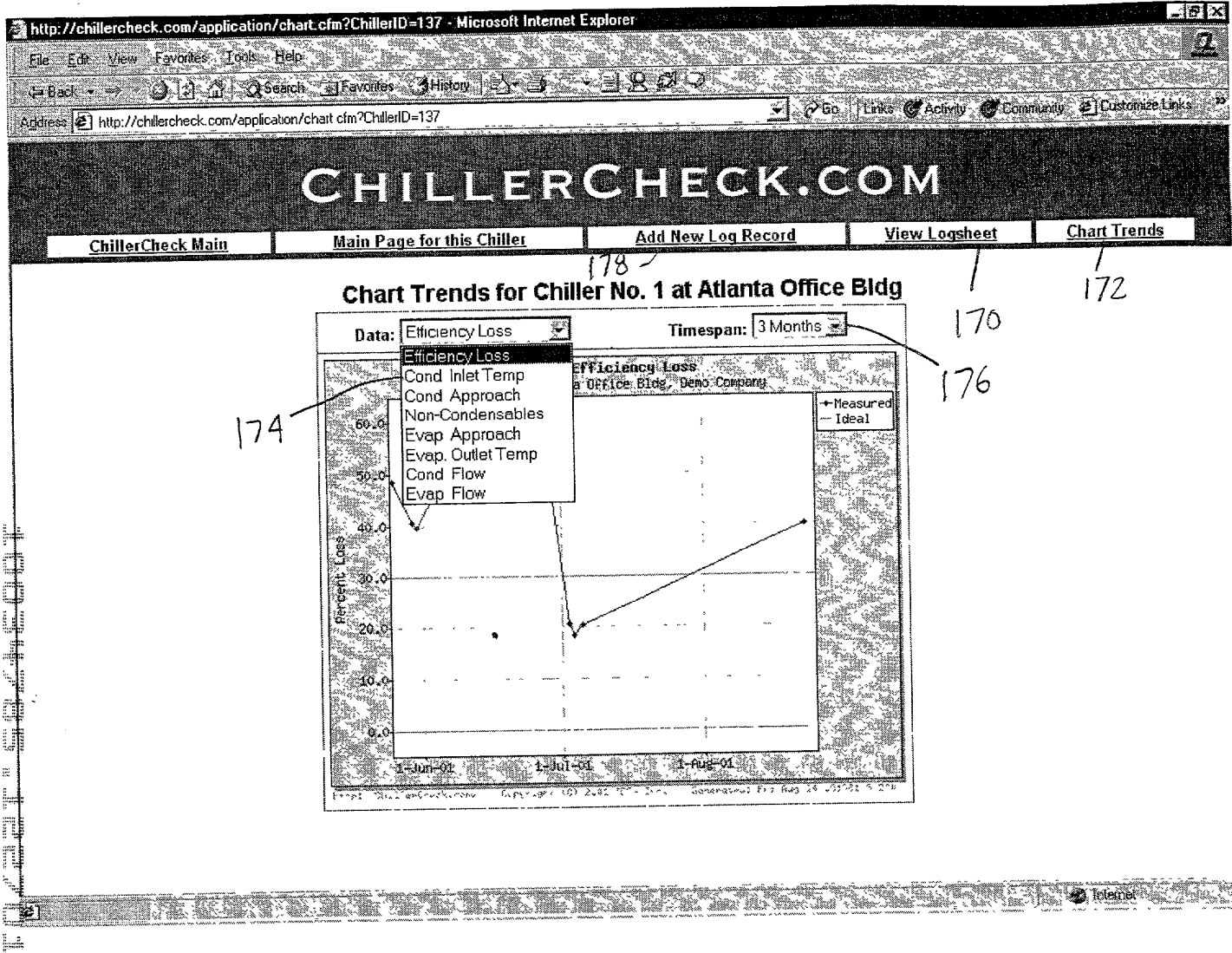


FIG. 10

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CHILLERCHECK.COM

ChillerCheck Main | Main Page for this Chiller | Add New Log Record | View Logsheets | Chart Trends

Add a Log Record for Chiller #: 1 at Main Chiller Plant.

Please enter your readings into the form below, then click the "Add Record" button:

Log Record

Operator:	Tim
Reading Date:	August 24, 2001
Reading Time:	9:32 AM
Condenser Readings	
Inlet Water Temp:	<input type="text"/> °F 184
Outlet Water Temp:	<input type="text"/> °F 186
Refrigerant Temp:	<input type="text"/> °F 188
Condenser Pressure:	<input type="text"/> PSIG 190
Actual Condenser Water Pressure Drop:	<input type="text"/> PSIG 192
Evaporator Readings	
Inlet Water Temp:	<input type="text"/> °F 194
Outlet Water Temp:	<input type="text"/> °F 196
Refrigerant Temp:	<input type="text"/> °F 198
Evaporator Pressure:	<input type="text"/> In. Hg. 200
Actual Chill Water Pressure Drop:	<input type="text"/> PSIG 202

FIG. 11A

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10034485-12301

Compressor Readings	
Oil Pressure (High):	<input type="text"/> lb. 204
Oil Sump Temp:	<input type="text"/> °F 206
Oil Level:	<input type="text"/> % 208
Bearing Temp:	<input type="text"/> °F 210
Run Hours:	<input type="text"/> 212
Purge Pumpout Time:	<input type="text"/> 214
Electrical Readings	
Amps Phase 1:	<input type="text"/> 216
Amps Phase 2:	<input type="text"/> 218
Amps Phase 3:	<input type="text"/> 220
Volts Phase 1:	<input type="text"/> 222
Volts Phase 2:	<input type="text"/> 224
Volts Phase 3:	<input type="text"/> 226
Operator Notes	
<div style="border: 1px solid black; height: 100px; width: 100%; position: relative;"> <div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); font-size: 2em;">228</div> </div>	
<div style="border: 1px solid black; padding: 5px;"> Add Log Record <input type="text"/> 230 </div>	

FIG. 11B

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ChillerCheck Main

Chiller #1 Main Page

Maint. Records

Add Maint. Record

Add Log Record

View Logsheet

Chart Trends

CHILLERCHECK.COM

Patent Pending

Efficiency Calculation for Chiller #1 at Admin Bldg.
Reading taken on October 10, 2001 at 1:50 PM

163 165 Results

Target Cost to Run for Year	\$ 54,583
Actual Cost to Run for Year	\$ 65,993
Cost of Efficiency Loss	\$ 11,410
Efficiency Loss	20.9%

Detailed Cost of Efficiency Loss

Problem	Efficiency Loss	\$ Cost	Solution
Fouled Tubes - Condenser	9.5%	\$ 5,187	Fix it.
Non-condensables - Condenser	11.4%	\$ 6,222	Fix it.

Your Condenser Water Flow is 3.6% below design.

Your Evaporator Water Flow is 21.9% below design.

There is an electrical imbalance that may be decreasing the performance of your Chiller.
The voltage imbalance is 3.62%.

The % load at this reading time was 88.9%.

Back to the main page for this Chiller.

FIG. 12

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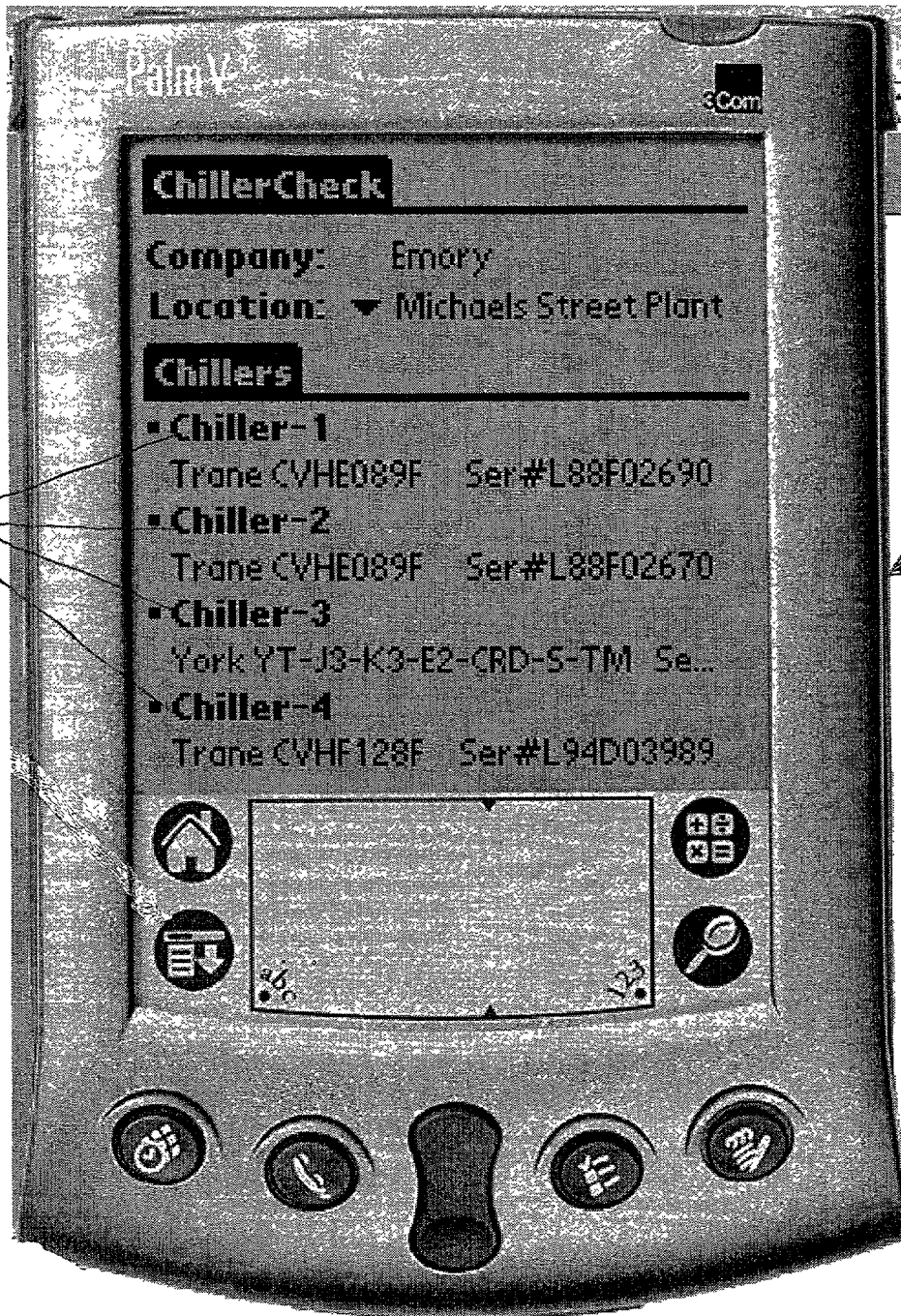


FIG. 13

10034785-122701

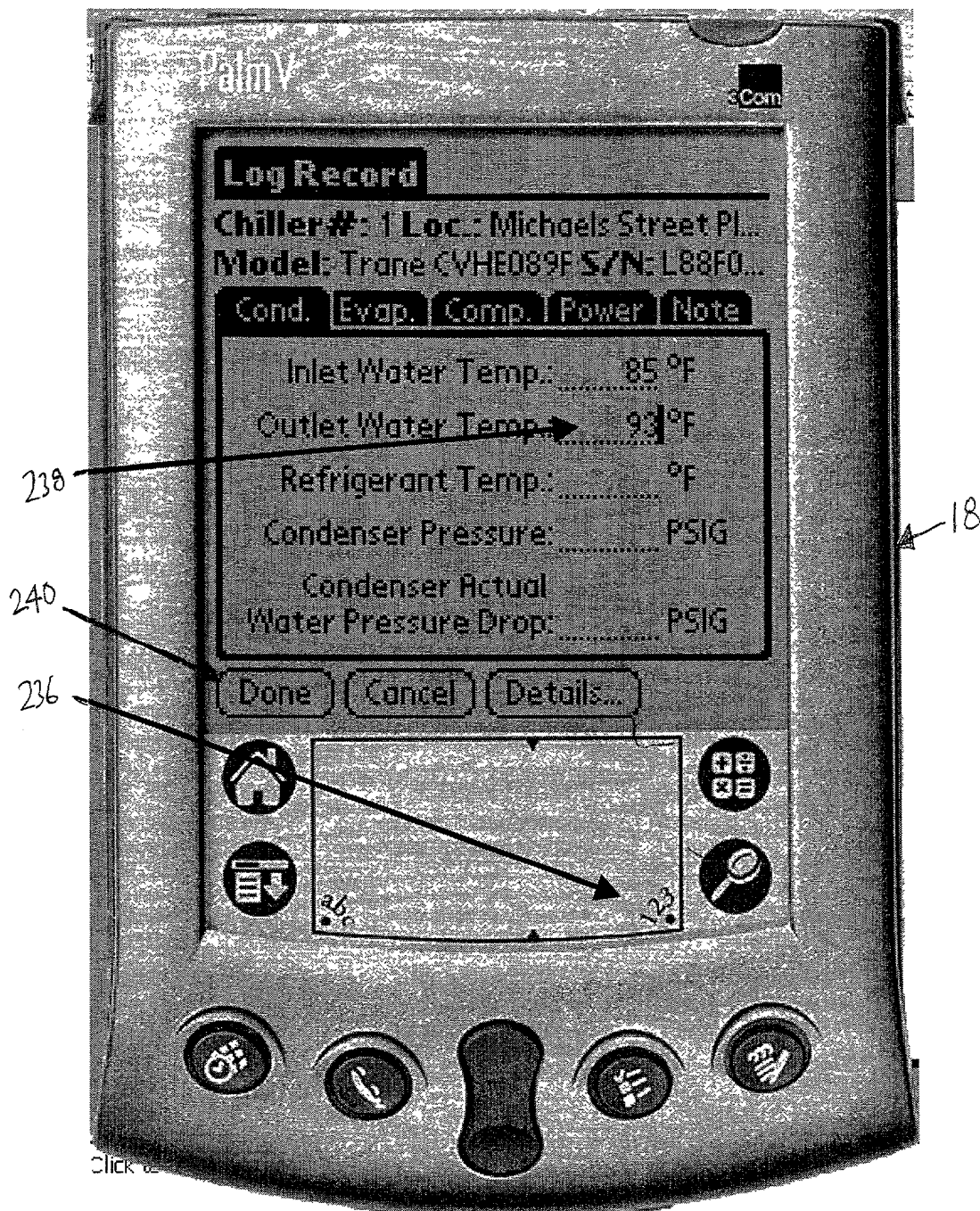


FIG. 14

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10034785-12201

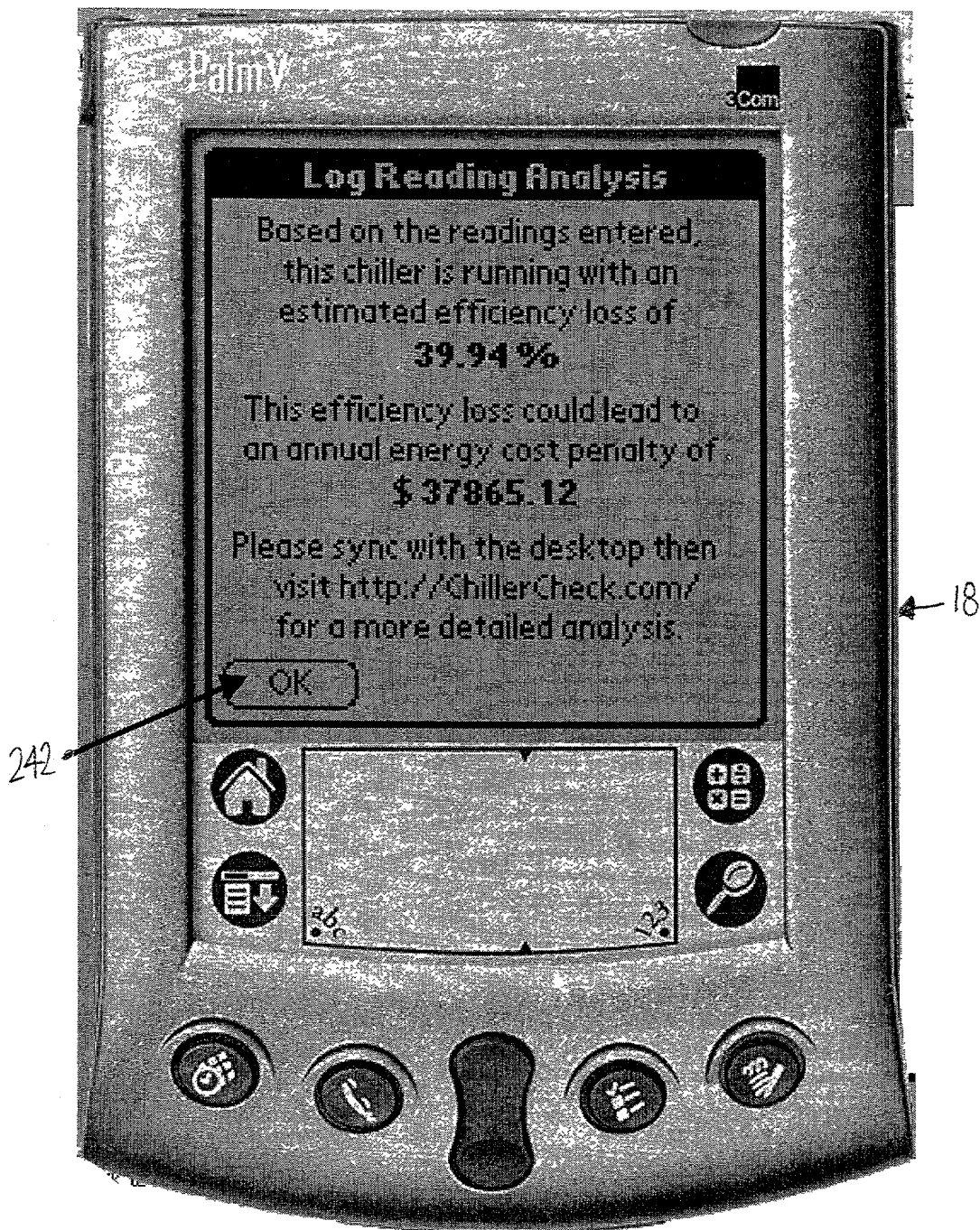


FIG. 15

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Patent Pending

ChillerCheck Main	Chiller #1 Main Page	Maint. Records	Add Maint. Record	Add Log Record	View Logsheet	Chart Trends
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Add Maintenance Record for Chiller #1 at Admin Bldg.

Please fill in all information in the form below, then click the "Add Maintenance Record" button.

You will then be taken back to the Maintenance page for this chiller.

Maintenance Information

Annual Maintenance Date:	Select a Month	Day	Year
Oil Maintenance			
Oil Change Date:	Select a Month	Day	Year
Date Oil Added:	Select a Month	Day	Year
Quantity of Oil Added (Gallons):			
Oil Analysis Date:	Select a Month	Day	Year
Eddy Current Tests			
Eddy Current Test Date (Condenser):	Select a Month	Day	Year
Eddy Current Test Date (Evaporator):	Select a Month	Day	Year
Major Stop Inspection (compressor teardown)			
Major Stop Inspection:	Select a Month	Day	Year
Refrigerant Maintenance			
Refrigerant Analysis Date:	Select a Month	Day	Year
Date Refrigerant Added:	Select a Month	Day	Year
Quantity of Refrigerant Added (Pounds):			
Tube Cleaning			
Condenser Tube Cleaning Date:	Select a Month	Day	Year
Evaporator Tube Cleaning Date:	Select a Month	Day	Year
Purge Maintenance			
Purge Tank Reclaim Date:	Select a Month	Day	Year
Purge Run Time Reading When Tank Reclaimed:			

FIG. 16A

100445-1201

1003485-10201

Purge Filter Dryer Change Date:		Select a Month ▼	Day ▼	Year ▼
Major Repairs				
Major Repair Date:		Select a Month ▼	Day ▼	Year ▼
Major Repair Description:				
Notes				
Maintenance Notes: (You may enter a note about any type of maintenance.)				
<div>Add Maintenance Record</div>				

FIG. 16B

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Patent Pending

ChillerCheck Main	Chiller #1 Main Page	Maint. Records	Add Maint. Record	Add Log Record	View Logsheet	Chart Trends
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Maintenance Records for Chiller #: 1 at Admin Bldg.

Below is a list of the most recent Maintenance Operations for your Chiller # 1. You may click on the name of a Maintenance Type to view all records of that type.

Maintenance Type	Most Recent Maintenance
Annual Maintenance:	October 18, 2001
Oil Maintenance	
Oil Change:	October 18, 2001
Oil Analysis:	October 1, 2001
Eddy Current Tests	
Condenser Eddy Current:	September 9, 2001
Evaporator Eddy Current:	September 10, 2001
Major Stop Inspection (compressor teardown)	
Major Stop:	January 3, 2000
Refrigerant Maintenance	
Refrigerant Analysis:	January 3, 2000
Refrigerant Added:	August 23, 2001 – Quantity: 100 Pounds
Tube Cleaning	
Condenser Tube Cleaning:	October 19, 2001
Evaporator Tube Cleaning:	February 5, 2000
Purge Maintenance	
Purge Tank Reclaim:	February 7, 2001 – Purge Run Time at Change: 1212123
Major Repairs	
Major Repair:	April 4, 2000 Repair Description: motor burnout
Maintenance Notes	
Notes:	November 5, 2001 Note: starter problems resulted in burnout

FIG. 17

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